CHEM MAJOR NEWS

In Conjunction with the American Chemical Society
Student Affiliates at the University of Pittsburgh

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Welcome Back!

The holidays have passed yet the cold Pittsburgh winter air remains! While the campus is frigid, we still have our lovely home of Chevron to retreat to. Chemistry students have the advantage in the winter months - we can always warm up around the Bunsen burners! If that's not enough, we can work on our stoichiometry to create the perfect exothermic reaction to heat us up… I don't see any other departments doing that in the winter months!

While it is sad to realize we're already halfway through another academic year (and in the coldest part), it's important to reflect on what all we've accomplished and how much more we can all do. You don't have to be a professor to evaluate yourself – anyone can! Take a moment to reflect on 2019 and grade yourself. Reflecting on the year, are you happy with your campus involvement? Are you satisfied with your academic performance? Have you been maintaining your health (physical and mental)? Are you upholding meaningful relationships with others? These may seem like daunting questions, but it is important to reflect and be critical with oneself. No one in the world is perfect and it is completely normal to not be satisfied with yourself. This self-evaluation is crucial for your personal development and ability to improve. There's no need to sit around and apologize to oneself about any dissatisfactions. Look back on 2019 and realize that the best apology is a changed behavior.

Once we have looked back and reflected, the next step is to look forward. I certainly don't have 20/20 vision, but I can look ahead and know there are great things to come for all of us this year (hopefully including better puns). After reflecting, the only way to improve (and hold ourselves accountable to improving) is through setting goals. Your goals shouldn't be easy, but they shouldn't be something you know you won't be able to accomplish. An effective goal must be tangible and measurable. It's something that by the end of the year, you should be able to put a checkmark by and know you completed it. Try setting a goal for yourself in many aspects of your life. From academics to health to ACS involvement. Push yourself and jump out of your comfort zone. Be brave and be bold and be the best you that you can be.

Mr. Rogers once said, "One of the greatest gifts you can give anybody is the gift of your honest self." Make 2020 the year that you can be you and embark on a mission to be true to yourself. Set goals, work relentlessly towards them, and reflect at the end of the year more humbled and prouder than ever before. Achieving your goals takes commitment one day at a time. Remember to spend today like others won't--so you can spend tomorrow like others can't.

Looking forward to the New Year and seeing everyone accomplish their goals!

Luke Persin
ACS Newsletter Co-Editor

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Visit us at http://www.chem.pitt.edu/acs-sa/

Green Chemistry

by: Caitlyn Giron
Green Chemistry Contributer

Analytical chemistry is the science of determining what matter is made of and how much of it is present. Large amounts of harmful solvents are often used in analytical chemistry techniques and this creates a hazard for humans and the environment. Applying green chemistry methods to analytical chemistry consists of developing techniques that are efficient, use safe chemicals, and minimize waste.[1].

Green chemistry mostly focused on organic synthesis rather than analytical chemistry at its beginning, so green analytical chemistry is relatively new. One challenge with green analytical chemistry is finding a good balance between being environmentally friendly and increasing the quality of results. To determine how environmentally friendly an analytical method is, each step needs to be analyzed individually. The green chemistry principles (1) prevention of waste, (2) safer solvents, (3) design for energy efficiency, and (4) reduction of derivatization can be applied to analytical chemistry. The accuracy, precision, and sensitivity of the analytical method can decrease when applying one of the green chemistry principles, however. These problems can be solved in simple ways, such as improving calibration. The rapid development of technology will also help to resolve any accuracy, precision, and sensitivity issues in the future and improve green analytical chemistry.[2].

Analytical chemists are responsible for determining the efficiency and safety of reactions and their products. One way an analytical chemist can perform green chemistry practices is by only analyzing the minimum number of sample at the minimum sample size so that no resources or products are wasted. Greener solvents and chemicals can also be used to increase the environmental friendliness of analytical chemistry. In one example, the software HPLC-EAT (Environmental Assessment Tool) can be used by analytical chemists to analyze how sustainable their HPLC method is by looking at the solvent used. A method called Eco-Scale is also helping analytical chemists use greener methods. Eco-Scale assesses the human exposure, volatility, waste treatment, and energy use of a certain chemical or analytical method to determine how green the procedure is.[1].

Many analytical methods have become more environmentally friendly by applying the green chemistry concepts of using different instrumentation and methods. Instead of HPLC, microchip electrophoresis can be used to determine the amount of nitrate in tap water. This method has a reduced reagent and energy use compared to HPLC, but it does have a lower sensitivity. The use of harmful organic solvents is also avoided with this method. Additionally, handheld FTIR can be used to analyze the petroleum hydrocarbons in soil instead of GC-FID. Handheld FTIR takes in-situ measurements, does not consume reagents, and does not require sample treatment. However, this method has a high detection limit.[2]. These two examples are only a few ways changing the instrumentation can make analytical chemistry techniques greener.

The greenest analytical method and instrument is one that is direct, automated, and miniaturized. Integration of analytical processes into one method also increases greenness because all of the information needed is obtained in one analysis. Decreasing the number of steps in an analytical method or the amount of reagents used will decrease the amount of waste created. Transitioning from gram and milliliter scales to micro- and nanoscales significantly reduces the amount of reagents and samples needed for analysis. However, the testing sample could become less representative of the overall sample at such a small scale.[3]. Organic solvents should also be replaced in analytical methods to be more environmentally friendly. Ionic liquids or supercritical fluids can replace harmful organic solvents and increase operator safety. Reagents obtained from renewable resources can also replace certain reagents to increase greenness.[2].

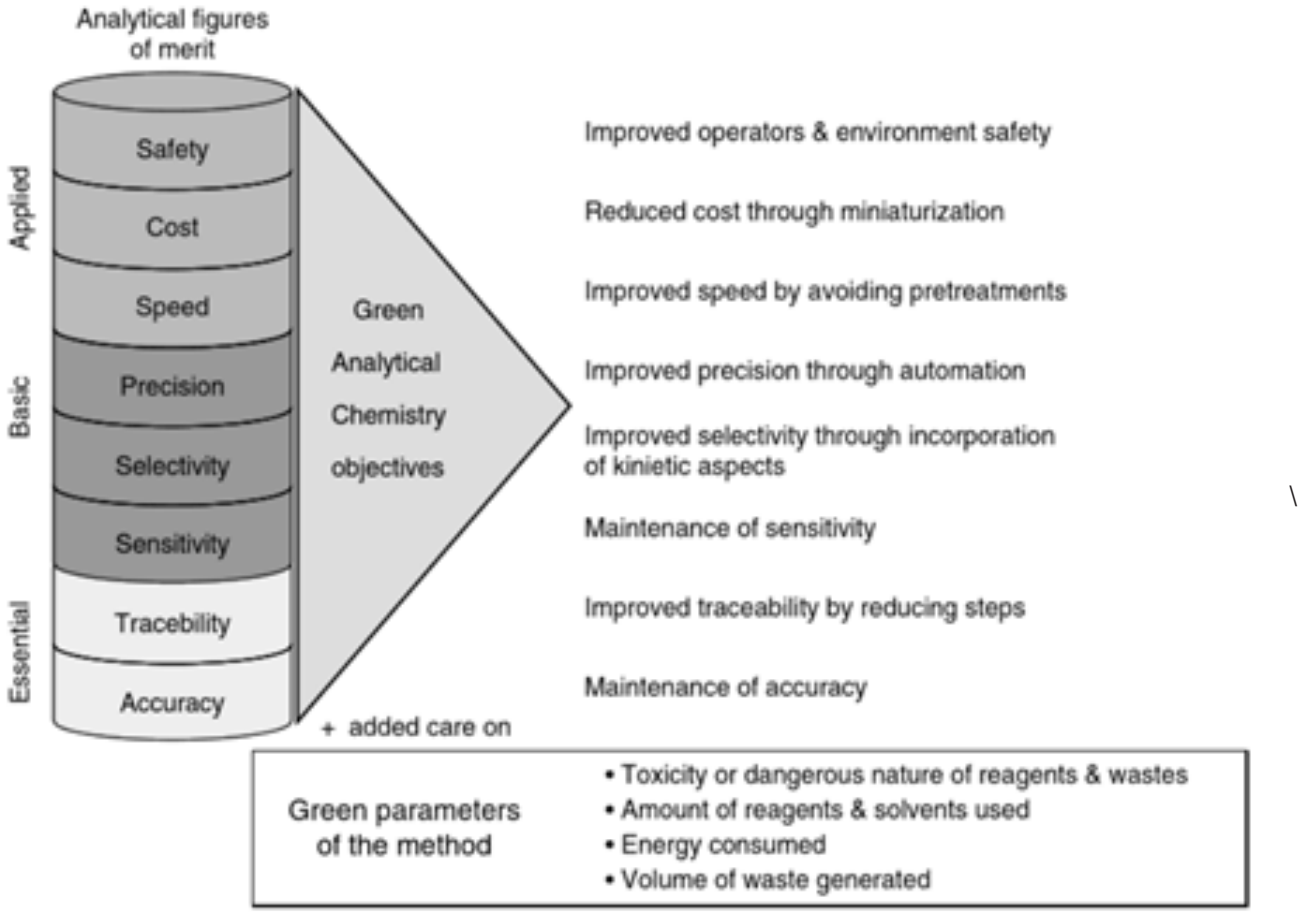


Figure 1.

How applying green chemistry to analytical chemistry can improve safety, cost, speed, precision, selectivity, sensitivity, traceability, and accuracy.[3].

Sources:

1. Green Chemistry: Analytical Chemistry. American Chemical Society. https://www.acs.org/content/acs/en/greenchemistry/research-innovation/analytical-chemistry.html

2. Agnieszka Galuszka; Zdzislaw Migaszewski; Jacek Namiesnik. The 12 principles of green analytical chemistry and the SIGNIFICANCE mnemonic of green analytical practices. TrAC [online] 2013. https://www-sciencedirect-com.pitt.idm.oclc.org/science/article/pii/S0165993613001234

3. Handbook of Green Analytical Chemistry, edited by la Guardia, Miguel de, and Salvador Garrigues, John Wiley & Sons, Incorporated, 2012. ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/pitt-ebooks/detail.action?docID=860886.

The University of Pittsburgh Department of Chemistry

is proud to announce

The Wass and McKeever

Summer Undergraduate Research Fellowships

- The Undergraduate Research Fellowship will be awarded this Summer 2020.

- This Fellowship will provide a Summer stipend of $3,500.00 to the recipient for work carried out in the research lab of our faculty member.

- Please submit a letter of recommendation from a Faculty Mentor which includes your qualifications and details of the planned research project (1-2 pages) and a **one** page personal statement of your future goals to **Dr. George C. Bandik in Room 107 Chevron Science Center by February 14, 2020.** All nominations will be reviewed by our Undergraduate Curriculum Committee and the recipient will be recognized at our Undergraduate Spring Term Awards Ceremony within the University of Pittsburgh, Department of Chemistry.

Deadline to receive all materials for this Fellowship is February 14, 2020.

2020 January ACS-SA Schedule

January

10 **Welcome Back with Pizza**
First Meeting of the Term

17 **Big Idea Center Program**
with Babs Carryer

24 **A Professional School Discussion**

31 **Study Abroad in the Sciences**
with Jeff Whitehead

I Need a Job!

It's that time of year! Time to begin the search for a summer position. There are several opportunities for summer opportunities available to Chemistry majors.

The first place to look is the Chem Major News area of the first floor hallway. Here you will find the current Research Experiences for Undergraduate (REU) listings. They are from all over the country.

You may also want to visit Career Services (2nd floor WPU).

Ms. Emily Bennett can help you with opportunities available through their Office.

Finally, don't forget the Arts and Sciences Office of Experiential Learning (B-4, Thaw Hall). Mr. Patrick Mullen can assist you there.

With all of these opportunties available, it should be an exciting and productive summer for everyone. Good Luck!

American Chemical Society

Student Affiliates, University of Pittsburgh

Membership Application

This is a powerful professional organization for the benefit of individuals interested in chemistry and related fields. Our organization offers exciting extracurricular activities and many outstanding opportunities for our members, including:

1. **WEEKLY MEETINGS**-to plan activities, provide interesting speakers, discuss ideas, and keep students aware of what is happening in the scientific community.

2. **ANNUAL TRIPS**-Each year we sponsor (a) trip(s), to external chemistry environments, as well as for social enjoyment. Significantly reduced rates are available to active members. In the past few years we have traveled to New Orleans, Atlanta and New York.

3. **PROFESSIONAL NETWORKING**-Our organization has many opportunities to make contacts with professionals in both the scientific industry and academia. Student affiliates also have the opportunity to join the National ACS.

4. **SOCIAL ACTIVITIES**-We sponsor many activities throughout the year just for fun.

Our meetings are held every Friday at 12:00 noon in Room 150 Chevron Science Center. To join, complete the application form below and come to one of our meetings. Our first meeting will be January 10, 2020 but you may join any time throughout the year.

Name: _____

School Address: _____

_____

Permanent Address: _____

_____

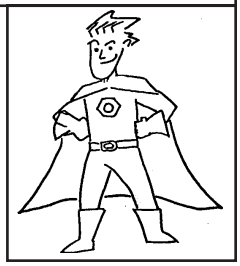
School Phone: _____ Home Phone: _____

Major: _____ Year in School **Fr.** **So.** **Jr.** **Sr.**

E-mail: _____

May we include your name, number and e-mail on the published phone list? **YES** **NO**

To submit this form by mail, send it to ACS-SA, Box 24, Chevron Science Center, University of Pittsburgh, Department of Chemistry, Pittsburgh, PA 15260. Be sure to include the $15.00 dues (make checks payable to the University of Pittsburgh). It is possible to be active even if you can not attend the meetings. For more information, see our display case in the lobby of Chevron Science Center.



Department of Chemistry

2020
Undergraduate Summer Research Fellowships in Organic & Biological Chemistry

- We are pleased to offer Undergraduate Summer Research Fellowships for Pitt students sponsored by *the Organic and Biological Chemistry Divisions*.
- These Fellowships are intended to support a 10-week full-time organic chemistry or chemical biology research project, including stipend & supplies, in the summer of 2020 at the Department of Chemistry in Pittsburgh.

Please submit applications consisting of a current resume, course records, and a letter of recommendation by a suitable Faculty Sponsor with details of the planned research project (not exceeding 1 page) by

February 20, 2020 to Desirae Crocker, CHVRN 757.

- The Award will be presented at the Undergraduate Award Ceremony in April 2020.
- The Awardee and Faculty Sponsor(s) are strongly encouraged to present a poster on their research at Science 2020 in Pittsburgh in the fall of 2020, and/or actively participate in an equivalent departmental, regional or national scientific conference.

Bayer

Bayer began as a general partnership between Friedrich Bayer, a dye salesman, and Johann Friedrich Weskott, a master dyer, in order to manufacture and distribute various synthetic dye products[1]. Founded in 1863, the duo wanted to take advantage of the production of dye from coal-tar derivatives as the process had only been invented a few years prior. As a new field of business in the chemical industry Bayer and Weskott decided to target the textile industry which coincidentally was quickly expanding due to industrialization[1]. Until this point in time, natural dyes had been used, however they were extremely difficult to procure as they were both expensive and scarce. Due to industrialization, new inventions such as the synthesis of the red dye alizarin allowed for companies with their own research facilities and a foothold in the international market to survive and expand over the long term[1]. Bayer happened to be one of those companies.

By 1881, Weskott and Bayer converted their former general partnership into a joint stock company titled “Farbenfabriken Vorm. Frieder. Bayer & Co. [1]” Additionally, their company had expanded in overall employment. During the company’s inception, they maintained a staff of three individuals. By 1881, they had expanded to more than 300[1]. Over the next thirty years, Weskott and Bayer concentrated their focus on becoming a force in the international market. While they maintained strong production of dye products, new fields of business joined the fold. One major factor in Bayer’s continued development was the establishment of the capability to conduct major research. This capability was led by Carl Duisberg. A scientific laboratory was built in Wuppertal-Elberfield, which also served at the company’s headquarters from 1878 until 1912[1]. These research capabilities set new standards for the industry and as a result gave rise to the “drug of the century, Aspirin®.[1]” Developed by Felix Hoffmann and launched onto the market in 1899, aspirin aided an individual’s health by allowing them temporary pain relief and management[1].

Unfortunately, Bayer’s booming success came to a screeching halt. The culprit, was World War I. The company was cut off from many of its major export markets[1]. Additionally, the overall sales of dyes and pharmaceuticals had dropped significantly. To compensate, Bayer was forced to integrate into the war economy by producing materials for war. Among the products created by Bayer was explosives and chemical weapons[1]. Overall, the effects of the war were devastating for Bayer. The company had lost most of its foreign assets and export markets[1]. Bayer’s Russian subsidiary was seized as a result of the Russian Revolution. In the United States, Bayer lost various assets including the confiscation of its patents and trademarks, which were then auctioned off to competitors[1]. By 1919 sales plummeted and inflation had exhausted Bayer’s financial resources. This process repeated again during World War II. Even though faced with the brink of organizational collapse, Bayer prevailed.

The reconstruction of Bayer was closely linked with the Wirtschaftswunder, or the "economic miracle", in the Federal Republic of Germany[1]. While still under Allied control, Bayer began to reestablish its sales activities and acquire foreign affiliates abroad[1]. Initially, Bayer focused on Latin America and the United States. The foundation of this success was not only the reestablishment of operations, but also an increase in research and development[1]. Bayer focused on the further development of polyurethane chemistry, new crop protection products, fibers such as the polyacrylonitrile fiber Dralon, the thermoplastic Makrolon®[1]. Additionally, Bayer developed new dyestuffs for synthetic fibers[1]. New products such as cardiovascular medicines, dermal antifungals and broad-spectrum antibiotics emerged from Bayer's pharmaceutical laboratories[1].

By the early 2000s, Bayer had become an industry powerhouse. Acquisition of the polyols business of Lyondell Chemical Company allowed Bayer to become the world’s biggest producer of raw materials for polyurethanes[1]. Bayer acquired Aventis CropScience for €7.25 billion in 2001, making it a world leader in crop protection[1]. In October of 2003, the subgroups Bayer Chemicals AG and Bayer

HealthCare AG and the service company Bayer Technology Services GmbH are developed as independent sectors as part of the reorganization of the Bayer Group[1]. The subgroup Bayer MaterialScience AG, Bayer Business Services GmbH and Bayer Industry Services GmbH & Co. OHG, two service companies, follow suit in December[1].

Bayer Today

Bayer: "Passion to Innovate. Power to Change."

Bayer is a worldwide, industry leader in the human, animal and plant health fields. The company prides itself on the invention of solutions that aid in the creation of a sustainable future for the planet[2]. While working for Bayer, you can expect to focus primarily on these four criteria[2]:

(1) Innovations and Solutions
(2) Development and Teamwork
(3) Creating a Better Life and Challenges
(4) Overall Reputation and Impact

"At Bayer, innovation is part of our DNA. [2]" Bayer's working culture is driven by their passion for thinking ahead and being open to new and unconventional ideas. Their research and development team, with over 14,000 researchers, share one main goal: improve people's lives[2]. They aim to develop life-saving medication for humans and animals as well as creating a broad range of biological and chemical products to aid plant health[2]. The company has created two initiatives to further their goal of innovation and solutions. The first, WeSolve, allows employees to contribute challenging questions, ideas and suggestions to the Bayer Ideas Pool for future consideration on how to improve the company[2]. The second is the Bayer Employee Survey, which empowers employee involvement and helps to inspire innovation[2].

As a part of their goal of development and teamwork, Bayer concentrates on creating an environment that fosters discussion and collaboration. At Bayer, the company utilizes 360 Feedback as an important developmental tool to boost employee leadership and enhance each individual's strengths and talents[2]. The Bayer Group also employs people from 127 countries around the world and promoting collaboration among employees from different cultural background is crucial to their success[2]. Bayer also utilizes a corporate university known as The Bayer Academy. The objective of the academy is to support on-the-job development by utilizing systematic training programs and seminars to further enhance career development[2]. These learning opportunities are offered around the world and in multiple languages that help Bayer balance global and local needs while simultaneously strengthening cross-organizational collaboration, networking and innovation[2].

At Bayer, the company maintains a focus on creating a better life for their customers and solving challenges that society may face. As a part of their mission, Bayer continually develops new treatment options that utilize active substance to treat diseases that have a high, unmet medical need[2]. As an arm of the Bayer machine, Bayer CropScience allows the company to create innovative concepts safeguard nutrition and promote sustainable agriculture. Bayer supports all partners from seed to shelf and farm to table[2].

Finally, Bayer is an international science-based company that plans to impact the future and fully improve the way in which people live. Bayer makes every effort to maintain an esteemed reputation by being a global corporate citizen that contributes unique innovations that improve life no and in the future. As a part of their team, you can expect to feel empowered to address societal challenges and create a lasting impact with various ideas and solutions. Making the world a better place is Bayer's passion.

Employment

Below are a handful of current job openings in the Pittsburgh market. For other job openings in other global markets or for more information regarding Bayer, feel free to visit their website https://www.bayer.com/.

Students

Bayer offers many options for students who want to gain valuable work experience while exploring your interests with passion and dedication. More than 2,900 students around the world were offered internships at Bayer. Listed below is an opportunity of interest:

Position: Supply Chain Intern*
Location: Pittsburgh, PA
Description: Develop technical expertise to increase efficiency and flexibility of department. Prepare and issue reports related to supply chain function

accuracy and completeness. Identify projects and initiatives to increase efficiencies and drive resolution. Develop and evaluates ideas, options and solutions.
Requirements: Currently pursuing a bachelor's degree in Supply Chain Management, Business or Engineering function. Solid understanding of Excel Modeling and Supply Chain Management concepts. Demonstrated high performance orientation, customer focus and cross functional collaboration/teamwork skills. Excellent written, persuasion and consensus building, listening and verbal communication skills.

*Currently the only internship position available in the Pittsburgh area. There are other internships available in various fields across the globe. For more information visit https://career.bayer.com

Graduates

Bayer believes helping recent graduates build a strong professional foundation while developing a expertise in your field of choice. Bayer offers five unique graduate programs that build on your academic achievements and those are listed below:

- International Future Leadership Program for Production
- International Trainee Program for Financial Management
- International HR Trainee Program
- Global Trainee Program for Supply Management
- Procurement Trainee Program

Each program has specific qualifications and requirements. For more information and links to applications for each program, please visit https://career.bayer.com/en/career/working-at-bayer/graduates/ifm.

Interview Tips

The time after submitting the application and before receiving notification to come in for an interview can feel like an eternity. Frustration mounts, anxiety heightens, and stress levels rise. Anyone who has ever applied for a job has been there. A key to lowering those stress levels and feeling more at ease through the process is to be as prepared as you can be for when that interview arrives. The Bayer Human Resources Team has a few helpful hints and tips that give you some peace of mind.

1.) BE AUTHENTIC

The main purpose of the interview is to allow for an opportunity for you and the company to get to know each other. During the interview you can expect to learn about the company as a whole as well as receive an in-depth look at the position you are interviewing for. In return, you should be prepared to discuss your level of experience you would bring to the position, your interest in the company and most importantly, your PASSION for your work.

2.) BE PREPARED

Interviewers for Bayer want to determine how well you and the company would work together. The company requests that you are not only on time, but relaxed. Be prepared to discuss your skills and experiences that qualify you for the position in great detail. Be sure to talk about how you were able to attain those skills throughout your academic, professional, and personal life.

References

1. Bayer AG. Global Home. https://www.bayer.com/en/homepage.aspx (accessed Dec 4, 2019).

2. Bayer AG. Excellent Perspectives for Bayer Employees. https://www.bayer.com/en/working-at-bayer.aspx (accessed Dec 8, 2019).